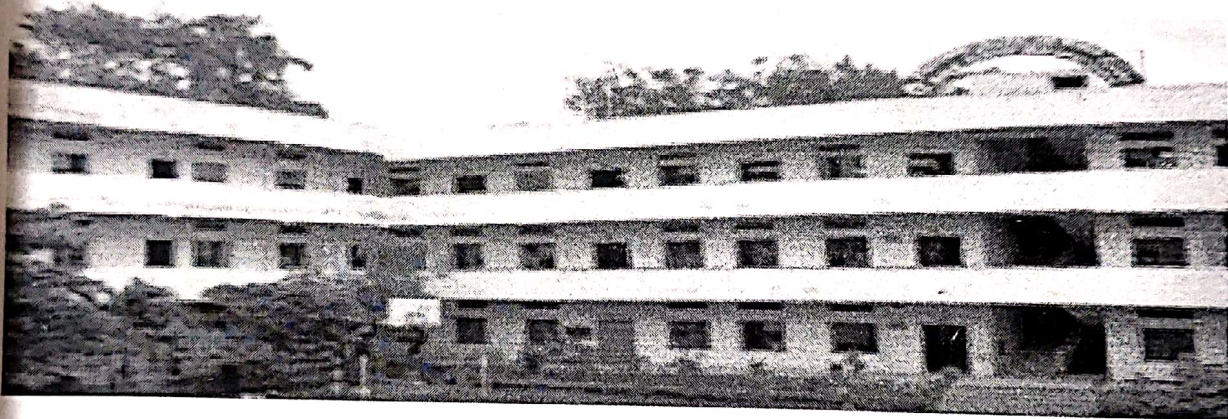


**GOVERNMENT DEGREE COLLEGE FOR
WOMEN, (AUTONOMOUS), BEGUMPET,
HYDERABAD.**

**WELCOME
TO
DEPARTMENT OF MICROBIOLOGY**



**APPROVAL FOR
CHOICE BASED CREDIT SYSTEM (CBCS) SYLLABUS
FOR
B.Sc. III YEAR
2021-22**

AGENDA FOR THE BOARD OF STUDIES MEETING



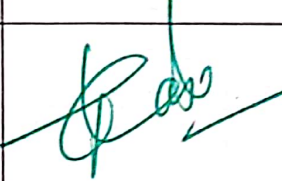


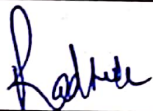
1. Approval of the syllabus for V and VI semesters of B.Sc. III year according to CBCS (Choice based credit system).
2. Re-Approval of the syllabus for I, III, II, IV semesters of B.Sc. I & II year according to CBCS (Choice based credit system).
3. Re-approval of Scheme of evaluation-Examination pattern to be followed for I, II, III and IV semesters.
4. Approval of Scheme of evaluation for V and VI Semesters (60 External; 40 Internal)
5. Approval of list of panel of examiners.
6. Any other matter with the permission of chair.

**GOVERNMENT COLLEGE FOR WOMEN
(AUTONOMOUS)**

BEGUMPET, HYDERABAD – 500016

DEPARTMENT OF MICROBIOLOGY

Composition of Board of Studies

S.No	Name		
01.	Dr. A. Madhuri Assistant professor & Head, Department of Microbiology GDC (W) A Begumpet	Chairperson BOS, GDC (W) A Begumpet	
02.	Dr. B. Bhima Board of Studies, Department of Microbiology, Osmania university	Chairperson BOS, University Nominee, Osmania University	
03.	Dr. Chand Pasha, Senior Assistant Professor & Head, Dept of Microbiology, Nizam Collge, Hyderabad.	Subject Expert Nominated by Academic Council	
04.	Shaikh Akbarpasha, Assistant Professor and Head Department of Microbiology, Girraj Govt. College (A), Nizamabad.	Subject Expert Nominated by Academic Council	
05.	Dr. E. Prasad, Senior Scientist, Fermentation technology development center, Dr.Reddy's Laboratories, Hyderabad	Representative from Industry	
06.	Ms. Radhika, M.Sc., Lecturer, Hindu Degree College, Sanathnagar, Hyderabad	Alumnus	

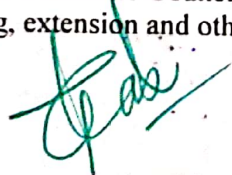
Term: The term of the Nominated Members shall be three years.

Meetings: The Board of studies shall meet at least twice a year.

Functions:

The Board of Studies of a Department in the college shall.

- Prepare syllabi for various courses keeping in view the objectives of the college, interest of the stakeholders and national requirement for consideration and approval of the Academic Council.
- Suggest methodologies for innovative teaching and evaluation techniques.
- Suggest panel of names to the Academic Council for appointment of examiners.
- Coordinate research, teaching, extension and other academic activities in the department /college.



GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS)

BEGUMPET, HYDERABAD – 500016

DEPARTMENT OF MICROBIOLOGY
Annexure – I (Credits)

Proposed CBCS Scheme for B.Sc.
w.e.f 2019-20

Courses		Papers	Total Credits	Credits for each paper / Semester					
				B.Sc.					
				I	II	III	IV	V	VI
Core Courses DSC	Optional-1	4	20	5	5	5	5	-	-
	Optional-2	4	20	5	5	5	5	-	-
	Optional-3	4	20	5	5	5	5	-	-
Elective Courses DSE	Optional-1	2	10	-	-	-	-	5	5
	Optional-2	2	10	-	-	-	-	5	5
	Optional-3	2	10	-	-	-	-	5	5
Language	English (First Language)	5	20	4	4	3	3	3	3
	Second Language	5	20	4	4	3	3	3	3
Ability Enhancement Compulsory Course AECC	Environmental Science /Basic Computer Skills	1	2	2	-	-	-	-	-
	Basic Computer Skills / Environmental Science	1	2	-	2	-	-	-	-
Skill Enhancement Course SEC	SEC1	1	2	-	-	2	-	-	-
	SEC2	1	2	-	-	2	-	-	-
	SEC3	1	2	-	-	-	2	-	-
	SEC4	1	2	-	-	-	2	-	-
Generic Elective GE	Open Stream	1	4	-	-	-	-	4	-
ProjectWork/Optionals		1	4	-	-	-	-	-	4
Total Credits in each semester				25	25	25	25	25	25
Total Credits in UG				150					
Credits under Non-CGPA		NSS/NCC /sports/ Extracurr icular	6	Up to 6 (2 in each year)					
		Summer Internship	4	Up to 4 (2 in each, after I & II years)					

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8/10/2021

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Saikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (A), Nizamabad

Handwritten signature
DR. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O. U.
Hyderabad-500 001. T.S.

Handwritten signature
Dr. B. Bhima
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyd.



**GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET**

HYDERABAD,
CHCS

DEPARTMENT OF MICROBIOLOGY

Code	Paper/ Title	Course Type	HPW	Credits
FIRST YEAR		SEMSTER - I		
BS	PAPER-I : General Microbiology	DSC-1A	4T+2P=6	4+1=5
FIRST YEAR		SEMSTER - II		
BS	PAPER-II: Microbial Diversity	DSC-1B	4T+2P=6	4+1=5
SECOND YEAR		SEMSTER - III		
BS	SEC-1: UGC given	SEC I	2	2
BS	SEC-2 Haematology	SEC II	2	2
BS	PAPER-III: Food and Environmental Microbiology	DSC-1C	4T+2P=6	4+1=5
SECOND YEAR		SEMSTER - IV		
BS 20	SEC-3: UGC given	SEC-3	2	2
BS	SEC-4: Mushroom Cultivation	SEC-4	2	2
BS	PAPER-IV : Medical Microbiology and Immunology	DSC-1D	4T+2P=6	4+1=5
THIRD YEAR		SEMESTER - V		
BS	GE-1: Microbiology and Human Health	GE-1	4T	4
BS	DSE-1A: Molecular Biology and Microbial Genetics DSE -1B: Microbial Omics	DSE-1A / DSE-1B	4T+2P	4+1=5
THIRD YEAR		SEMESTER - VI		
BS	DSE -2A: Industrial Microbiology DSE -2B: Pharmaceutical Microbiology	DSE- 2A/ DSE- 2B	4T+2P=6	4+1=5
BS	DSE-3: Applied Microbiology / Project work	PROJECT	3T+2P	4

Madh

Shaikh Akbar Siddique

Shaikh Akbar Siddique
M.Sc. NET, SET
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (A), Nizamabad

CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001, T.S.

Dr. B. Bhina
Dr. B. Bhina
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyd.

PROGRAM OUTCOMES

PO 1 Domain Expertise:

- Acquire comprehensive knowledge and skills.
- Make use of the knowledge in an innovative manner.
- Effectively apply the knowledge and skills to address various issues.

PO 2 Modern equipment Usage

- Use ICT effectively.
- Access, retrieve and use authenticated information.
- Access, retrieve and use authenticated information. Have knowledge of software applications to analyze data.

PO 3 Computing Skills and Ethics

- Develop rationale and scientific thinking process.
- Use technology intelligently for communication, entertainment and for the benefit of mankind.
- Ensure ethical practices throughout ones endeavors for the well being of human race.

PO 4 Complex problem Investigation & Solving

- Predict and analyze problems.
- Frame hypotheses.
- Investigate and interpret empirical data.
- Plan and execute action.

PO 5 Perform effectively as Individuals and in Teams

- Work efficiently as an individual
- Cooperate, coordinate and perform effectively in diverse teams/groups.
- Prioritize common interest to individual interest.

[Signature]
Shaikh Akbar Siddique

M.Sc. NET, SET
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (M), Nizamabad

[Signature]
CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Nizamabad-500 001. T.S.

[Signature]
D. B. Ghima
Chairman, BOC
Dept. of Microbiology
Osmania University, Hyd.



PO 6 Efficient Communication & Life Skills

- Express thoughts in an effective manner
- Listen, understand and project views in a convincing manner.
- Decide appropriate media to share information
- Develop skills to present significant information clearly and concisely to interested groups.

PO 7 Environmental Sustainability

- Understand sensibly the Environmental challenges.
- Think critically on environment sustainability measures.
- Propagate and follow environment friendly practices.

PO 8 Societal contribution

- Render service for the general good of the society.
- Involve voluntarily in social development activities at Regional, National, global levels.
- Have own pride in volunteering to address societal issues viz: calamities, disasters, poverty, epidemics.
- Be a patriotic citizen to uphold the values of the nation

PO 9 Effective Project Management

- Identify the goals, objectives and components of a project and decide the appropriate time of completion.
- Plan, organize and direct the endeavors of teams to achieve the set targets in time.
- Be competent in identifying opportunities and develop strategies for contingencies.

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Dr. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.

[Handwritten signature]
Dr. B. Shrinia
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyd.

[Handwritten signature]
Anaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology
Girraj Govt. College (A), Nizamabad



PROGRAM SPECIFIC OUTCOMES

- **PSO 1:** Capacity building to apply knowledge of biological concepts in various thrust areas of Molecular biology, Computational biology, Medical, Environmental, Agricultural, Food and Dairy microbiology considering the demand of academia, research, and industry.
- **PSO 2:** Correlate the knowledge of Biochemistry to various metabolic processes, Physiology, Endocrinology, Nutrition, Immunology, Health & disease and suggest solutions to biological problems through research and development.
- **PSO 3:** Utilise the concepts of Organic, Inorganic, General and Physical Chemistry to evaluate and develop analytical skills required for drug designing and green lab practices to safe guard the environment

Dr. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.

Dr. B. Bhimar
Chairman, BGS
Dept. of Microbiology
Osmania University, Hydr

Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (A), Nizamabad

GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS)

Begumpet-500016, HYDERABAD.

CBCS

DEPARTMENT OF MICROBIOLOGY

DSC-1A Semester - I Course Title :- General Microbiology

Credits: 4+1=5

Overall Course Objective: To give basic concepts of Microbiology

Course Objectives:

- Describe the history of Microbiology and contributions of various scientists in development of Microbiology.
- Discuss the morphological features of bacteria, viruses and isolation and preservation methods.
- To explain microbial nutrition and metabolism
- To discuss sterilization techniques and concept of growth.

Course Title :- General Microbiology

4HPW -Credits-4 Theory: 60 Lectures

UNIT-1: INTRODUCTION TO MICROBIOLOGY No. of hours: 15

Meaning, definition and scope. History of microbiology: Contribution of Louis Pasteur and Robert Koch, Edward Jenner, Antonie Van Leeuwenhoek, Alexander Flemming. Importance and application of Microbiology.

Principles of Microscopy-Bright field, Dark field, Phase-contrast, Fluorescent and Electron microscopy (SEM and TEM). Principles and types of stains-simple stain, differential stain, negative stain, structural stain-spore, capsule, flagella, Acid fast staining. Bacterial motility - Hanging drop method.

UNIT-2: STRUCTURE OF BACTERIA, VIRUSES & PURE CULTURE CONCEPT

No. of hours: 15

Prokaryotes - Ultra structure of eubacteria. - General characteristics of viruses, differences between bacteria and viruses. Classification of viruses

Morphology and structure of TMV and HIV. Structure and multiplication of lambda bacteriophage.

Isolation of pure culture techniques- Enrichment culturing, dilution plating, streak plate,

Give + give bacteria - differences.

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Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology
Giri College of Women's Studies
Hyderabad-500 001, T.S.

Dr. B. Bhama
Chairman, BoS,
Dept. of Microbiology,
Giri College of Women's Studies,
Hyderabad-500 001, T.S.



spread plate, pour plate method, Micromanipulator. Preservation of Microbial cultures — Sub culturing, overlaying cultures with minerals oils, lyophilization, glycerol stocks, sand cultures, storage at low temperature,

UNIT-3: MICROBIAL NUTRITION AND METABOLISM

No. of hours: 15

Microbial Nutrition — Nutritional requirement, Uptake of nutrients by cell. Nutritional groups of microorganisms — Autotrophs, Heterotrophs, Mixotrophs. Components and types of bacterial growth media — simple and complex media, algal Medium, mineral salts medium, nutrient agar medium, MacConkey agar and blood agar.

Respiration — Glycolysis, HMP Pathway, ED Pathway, TCA Cycle and Anaplerotic reaction, Electron Transport, Oxidative and substrate level phosphorylation.

UNIT-4: STERILIZATION TECHNIQUES AND MICROBIAL GROWTH

No. of hours: 15

Sterilization and disinfection techniques - Physical methods- Autoclave, Hot air oven, Laminas air flow, ultrasonication, Filter sterilization. Radiation methods - U. V rays, Gamma rays, Ultrasonic methods. Chemical methods - Alcohols, Aldehydes, Phenol, Halogens and Hypochlorides.


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.

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 2nd Edition, WCB McGrawHill, New York.
3. Madigan, M.T., Martinkl, I.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 Panicker, Medical Microbiology.


Shaikh Akbar Siddique

Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (A), Nuzvid


CHAND PASHIA
M.Sc. NET, SETS
Dept. of Microbiology
NIZAM COLLEGE O. T. S.
Hyderabad-500 001.


Dr. B. Bhima

Chairman, BOS
Dept. of Microbiology
Osmania University, Hyd.

I Semester

DSC-1A General Microbiology

PRACTICALS

2HPW-Credits-1

1. Handling and calibration of light microscope.
2. Simple and differential staining (Gram staining), Spore staining.
3. Microscopic observation of cyanobacteria (*Nostoc*, *Spirulina*), algae and fungi (*Saccharomyces*, *Rhizopus*, *Aspergillus*, *Penicillium*, *Fusarium*).
4. Isolation of T2 bacteriophage from sewage sample.
5. Preparation of media for culturing autotrophic and heterotrophic microorganisms — algal Medium, mineral salts medium, nutrient agar medium, MacConkey agar and blood agar.
6. Sterilization techniques: Autoclave, Hot air oven and filtration.
7. Enumeration of bacterial numbers by serial dilution and plating (viable count)
8. Isolation of pure cultures by streak, spread and pour plate techniques
9. Preservation of microbial cultures- Slant, Stab, Sand cultures, mineral oil overlay and glycerol stocks
10. Turbidometric measurement of bacterial growth and plotting growth curve.

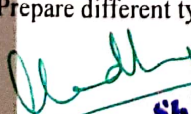
References:


- Experiments in Microbiology by K.R. Aneja.
- Gopa1Reddy.M., Reddy. M.N., SaiGopal, DVR and Mallaiah K.V. Laboratory Experiments in Microbiology.
- Dubey, R.C. and Maheshwari, D.K. Practical Microbiology, S. Chand and Co New Delhi.
- Alcamo, I.E. Laboratory Fundamentals of Microbiology. Jones and Bartlett Publishers. USA.


Course outcomes:

The student will be able to

- Summarize various discoveries and contributions in the history of Microbiology.
- Apply microscopy and staining techniques.
- Experiment different procedures of sterilization and preservation methods.
- Prepare different types of media.


Shaikh Akbar Siddique
M.Sc. NET SET
Assistant Professor & Head
Department of Microbiology
Girraj Govt. College, Nizamabad


CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.


Dr. B. Bhima
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyd



GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS)

BEGUMPET, HYDERABAD – 500016

CBCS

DEPARTMENT OF MICROBIOLOGY

Semester – II Course Title :- MICROBIAL DIVERSITY

Overall Course Objective: To explain about diversity in the microbial world.

Course Objectives:

- Basic concepts of microbial diversity.
- Explain the diversity of prokaryotic and eukaryotic microorganisms.
- Describe microbial interactions in an ecosystem
- Describe isolation of methanogens, halophiles.
- Explain observation of algae, protozoa and make winogradsky column.

DSC-1B

B.Sc. I Year: II Semester

Title: MICROBIAL DIVERSITY

4HPW - Credits-4

UNIT 1: CONCEPT OF BIODIVERSITY

Basic concept of Biodiversity and Conservation. Elements of Biodiversity - Ecosystem Diversity, Genetic Diversity, Species Abundance & Diversity. Economic Value of Biodiversity & Legal, Ethical and Conservation issues related to uses of biodiversity.

Classification of living organisms; Haeckel, Whittaker and Carl Woese systems.

Differentiation of prokaryotes and eukaryotes. Classification of bacteria as per the second edition of Bergey's manual of systematic bacteriology.

UNIT 2: PROKARYOTIC MICROBIAL DIVERSITY


General characteristics of eubacteria. Rickettsia, and Mycoplasma, Chlamydiae. Microbial richness: Exploration, significance, conservation and applications. Structural and physiological diversity of Archaea bacteria, Metabolic characteristics of extremophiles (Methanogens. Halophiles, thermoacidophiles).

Gram negatives: Cyanobacteria and Proteobacteria, Gram positives and heterogenous members including Firmicutes, Actinobacteria, Bacteroidetes, Acidobacteria and Planctomycetes.


Shaikh Akbar Siddique

M.Sc. NET, SET.

Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College, Nizamabad


DR. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.


Dr. B. Bhima
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyd



UNIT 3: EUKARYOTIC MICROBIAL DIVERSITY

Eukaryotic microbial diversity. Structural, physiological and metabolic characteristics of Algae - Cyanophyta, Chlorophyta, Bacillariophyta, Phacophyta, Rhodophyta; Fungi -Phycomycetes, Basidiomycetes, Zygomycetes, Oomycetes, Ascomycetes, Deuteromycetes (imperfect and perfect stages) and Protozoa - Giardia, Entamoeba and Plasmodium.

UNIT 4: MICROBIAL ECOSYSTEMS

Microbial interactions: Symbiosis, neutralism, commensalism, competition, antagonism, synergism, parasitism.

Understanding microbial diversity with cultivated vs uncultivated microorganisms.

The Great Plate count anomaly. Cultivation independent methods to assess microbial diversity. Preserved and perturbed microbial ecosystems, microbiome for sustainable agroecosystems. Human microbiome.

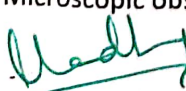
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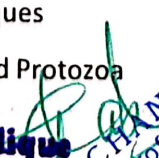
1. Pelczar Jr. M.J., Chan. E.C.S and Kreig.N.R (2006)."Microbiology"- 5th Edition McGraw Hill Inc. New York.
2. David, B.D., Delbecco, R., Eisen, H.N and Ginsburg, H.S (1990) "Microbiology" 5 Edition. H Painter, P.R. (1986). "General Microbiology" - Mac Milan Education Ltd. London.
4. Brown J. W. (2015) Principles of Microbial Diversity, ASM PFCSS
5. Epstein S.S. (2009) Uncultivated microorganisms, Springer-Verlag Publishers
6. Madigan M.T., Bender K.S., Buckley D.H., Sattley W.M. and Stahl D.A. (2017) Brock Biology of Microorgan

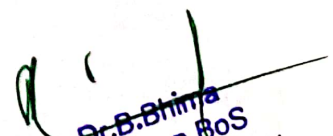
MICROBIAL DIVERSITY PRACTICALS

2HPW-Credits-1

- Isolation of Methanogenic bacteria from manure by anaerobic culturing
- Isolation and enumeration of halophiles from saline environment
- Isolation of bacteria from diversified habitats to demonstrate antagonism, commensalism and synergism
- Isolation of *Cyanobacteria* and fungi from different habitats
- Identification of fungi by staining techniques
- Microscopic observation of soil algae and Protozoa


Shaikh Akbar Siddique
M.Sc. NET, SET
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (A), Miramchar


CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE, O.U.
Hyderabad-500 001, T.S.


Dr. B. Bhina
Chairman, B.S
Dept. of Microbiology
Osmania University, Hyd.

- Winogradsky's column to demonstrate microbial diversity
- Visit and observe any nearby unique ecosystems to understand the role of microorganisms
- Demonstration of the great plate count anomaly

References:

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

Course outcomes:

Students will be able to

- Understand basic concepts of diversity and conservation.
- Explain diversity in prokaryotes and eukaryotes
- Acquaint knowledge on microbial interactions.
- Learn methods to assess microbial diversity.

DR. CHAND PASHA
 Asst. Professor & Head
 Dept. of Microbiology
 NIZAM COLLEGE O.U.
 Hyderabad-500 001, T.S.

Jnaikh Akbar Siddique
 M.Sc. NET, SET.
 Assistant Professor & Head
 Department of Microbiology,
 Girraj Govt. College (A), Nizamsar

Dr. B. Bhima
 Chairman, BoS
 Dept. of Microbiology
 Osmania University, Hyd.



GOVERNMENT COLLEGE FOR WOMEN
BEGUMPET, HYDERABAD – 500016
(AUTONOMOUS)
DEPARTMENT OF MICROBIOLOGY

Semester – III

Course Title :- Haematology HPW :- 2 Credits – 2

Course type: SEC-1 Code: BS

Overall Course Objective: To make students aware of different concepts related to blood.

Course objectives:

- Explain composition of blood, staining of blood films, composition of blood, blood grouping.
- Discuss total blood picture, differential count, blood borne diseases.
- Describe principles of blood transfusion, blood preservation.

UNIT-1: INTRODUCTION TO BLOOD

Blood: definition, characters, composition: Collection of blood – capillary blood: from adults and infants, examinations employed. Venous blood: from adults and infants, examinations employed composition of blood (RBC, WBC, Plasma, Serum, Platelet cells), Staining of blood films. Total blood picture, Differential count. Blood grouping, Rh-typing. Haemoglobin: composition and normal values, haemoglobin estimation Anti-coagulants.

UNIT-2: BLOOD TRANSFUSION

Principles of blood transfusion, Donor screening – cross matching, collection of blood, preservation and storage. Precautions of handling blood and it's products. Challenges in management of Hemophilia and Anaemia. General account on spread of diseases through blood and blood products. Coagulation mechanism: factors, bleeding time, clotting time. Haematological indices: packed cell volume. Erythrocyte sedimentation: principle – determination.

References:

1. Kawthalbar.Essentials of Haematology Paperback – 2013
2. Lokwani.D.P.The ABC of CBC Interpretation of Complete Blood Count and Histograms Paperback 2013
3. RamnikSood . Medical Laboratory technology Methods and Interpretation Jaypee

Shaikh Akbar Siddique
Shaikh Akbar Siddique
M.Sc. NET. SET
Assistant Professor & Head
Department of Microbiology.
Girraj Govt. College (A), Nizamabad.

Dr. Chandrashekhara D. Chandra
DR. CHANDRASHEKHARA D. CHANDRA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O. T.S.
Hyderabad-500 001.

Dr. B. Rama
Dr. B. Rama
Chairman, BoS
Dept. of Microbiology
Mania University, Hyd




Publications.

4. ShirishMKawthalkar. Essential Of Hematology. Jaypee Publication

Course outcomes:

- Understand basic concepts of Haematology.
- Learn staining of blood, blood grouping, Haemoglobin estimation.
- Acquaint knowledge about blood transfusion and blood preservation.
- Learn precautions of handling blood.



DR. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.



Dr. B. Bhisra
Chairman BoS
Dept. of Microbiology
Osmania University, Hyd.



Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (A), Nizamabad

GOVERNMENT COLLEGE FOR WOMEN
BEGUMPET, HYDERABAD - 500016
(AUTONOMOUS)
DEPARTMENT OF MICROBIOLOGY

Code: BS, DSC-IC

B.Sc II year: III Semester

Title: FOOD AND ENVIRONMENTAL MICROBIOLOGY

4 HPW-Credits-4

Overall course objective: Gain knowledge about food and environmental microbiology.

Course Objectives:

- Understand processing and significance of different fermented foods.
- Overview of causes of food spoilage and poisoning.
- Discuss significance of microorganisms in air and water and sewage treatment.
- Insight into concepts of soil microbiology.

Title: FOOD AND ENVIRONMENTAL MICROBIOLOGY

UNIT 1: FERMENTED FOODS

Introduction to fermented foods; Health aspects of fermented foods; Fermented vegetables: Processing and fermentation of Sauerkraut and pickles, idly. Dairy Microbiology - Types of microorganisms in milk, significance of microorganisms in milk, Microbial products of milk- Bulgarian milk, Kefir, cheese, yogurt; Microorganisms as food-SCP, Mushrooms; Probiotics and Prebiotics.

UNIT 2: MICROBIAL FOOD SPOILAGE AND POISONING

- Microbial Spoilage of foods; Microbial Food poisoning, risks and hazards; Mycotoxins and their poisoning/toxicity; Food preservation methods and food safety issues. Food Quality: Importance and functions of quality control. Methods of quality assessment of foods; Screening and Enumeration of spoilage microorganisms, Detection of pathogens in food - Biosensors, Microscopic methods, Immunological Detection Methods, Molecular Detection Methods

UNIT 3: AIR AND WATER MICROBIOLOGY

Microorganisms in air and their importance (brief account); Microorganisms and water pollution Water-borne pathogenic microorganisms and their transmission; Sanitary quality of

Handwritten signature
Dr. Naikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (A), Nizamabad

Handwritten signature
Dr. Chandrashekhara
Asst. Professor & Head
Dept. of Microbiology,
NIZAM COLLEGE, O.D.
Hyderabad-500 001, T.S.

Handwritten signature
Dr. B. Bhima
Chairman, BoS
Dept. of Microbiology
Manama University, Hyd.



water; Water pollution due to degradation of organic matter; Sewage treatment-small scale, large scale - primary, secondary and tertiary levels.

UNIT 4: SOIL MICROBIOLOGY

Soil properties (physical, chemical and biological), Soil microorganisms, Methods of enumeration and activity of microbes in environment/soil; Microbes and plant interactions — Rhizosphere, Phyllosphere and Mycorrhizae; Introduction to Microbial Bioremediation, Microbial degradation of organic pollutants; Carbon and Nitrogen cycle, P cycle.

References:

1. Stanbiiry, 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, McGraw-Hill, New York.
4. Jay, J.M. (1996). Modern Food Microbiology, Chapman and Hall, New York.
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 Banha, 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.

FOOD AND ENVIRONMENT MICROBIOLOGY PRACTICALS

2HPW-Credits-1

- Determination of microbiological quality of milk by MBRT method.
- Isolation of fungi & bacteria from spoiled fruits/vegetables/Milk/Meat products.
- Isolation of microorganisms from air by impingement method.
- Microbiological examination of water by coliform test.
- Determination of biological Oxygen demand.
- Extraction of Mycotoxins from contaminated grains/foods.
- Detection of Mycotoxins
- Isolation and identification of probiotic bacteria

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Shaikh Akbar Siddique
M.Sc. NET, SET
Assistant Professor & Head
Department of Microbiology,
Girraji College, O.U.

Chand Pasha
CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE, O.U.
Hyderabad-500 001. T.S.

Dr. B. Bhima
Dr. B. Bhima
Chairman, BoS
Dept. of Microbiology
Sri Manjunatha University, Hyd



- Isolation and identification of probiotic yeast

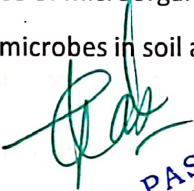
References:

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, McGraw-Hill, New York.
 4. Jay, J.M. (1996). Modern Food Microbiology, Chapman and Hall, New York.
 5. Ray, B. (1996). Fundamentals of Food Microbiology, CRC Press, USA.
- Atlas, R.M. and Bartha, R. (1998). Microbial Ecology - Fundamentals and Applications, Addison Wesley Longman, Inc., USA

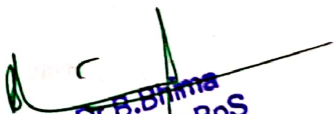
Course Outcomes:

Students will be able to


- Summarize different fermented foods and their significance.
- Understand concepts of food spoilage and food poisoning.
- Acquire knowledge about significance of microorganisms in air and water.
- Conceptual understanding of role of microbes in soil and bioremediation.



DR. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O. U.
Hyderabad-500 001. T.S.



Dr. B. Brima
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyd.



Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College, Osmaniaabad

GOVERNMENT COLLEGE FOR WOMEN
BEGUMPET, HYDERABAD – 500016
(AUTONOMOUS)

DEPARTMENT OF MICROBIOLOGY

IV Semester

Title: MUSHROOM CULTIVATION

Code: BS SEC-3

2HPW

Credits: 2

Overall course Objective: To understand the importance of mushroom cultivation.

Course Objectives:

- Study of mushrooms - nutritional and health benefits.
- Overview of steps in mushroom production.
- Discuss pests and pathogens of mushrooms and post harvest handling.

Title: MUSHROOM CULTIVATION

Code: BS SEC-3

UNIT-I

Introduction to mushroom cultivation. Importance and history of mushroom cultivation in India. Global status of mushroom production. Edible mushrooms (white button, oyster, Paddy straw). Nutritional value and health benefits of mushrooms. Recipes of Mushrooms.

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
- g. Entrepreneurship development in Mushroom cultivation

Pests and pathogens of mushrooms

Post harvest handling and preservation of mushrooms

Reference:

- Mushroom cultivation in india by B.C.Suman and V.P. Sharma Published by Daya publishing house New Delhi.
- Mushrooms Cultivation, Marketing and Consumption Manjit Singh Bhuvnesh Vijay Shvet Kama I G.C. Wakchaure Directorate of Mushroom Research (Indian Council Of Agricultural Research) Chambaghat. Solan —17321 3 (HP).

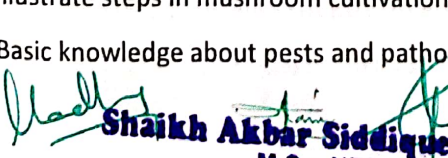
Course outcomes:

Students will be able to

CO1: Understand the importance of mushroom cultivation.

CO2: Illustrate steps in mushroom cultivation.

CO3: Basic knowledge about pests and pathogens and post harvest handling of mushrooms.


Shaikh Akbar Siddique
M.Sc. NET, SET
Assistant Professor & Head
Department of Microbiology
Girai Govt. College, Hyderabad


Dr. B. Shima
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyd



GOVERNMENT COLLEGE FOR WOMEN

BEGUMPET, HYDERABAD – 500016

(AUTONOMOUS)

DEPARTMENT OF MICROBIOLOGY

Code: BS, DSC-ID

4T+2P HPW

Credits-4+1

Paper - IV

Title: MEDICAL MICROBIOLOGY & IMMUNOLOGY

Overall Course Objective: Provide outline of medical microbiology and Immunology

Course Objectives:

COb1: Introduction to concepts of normal flora, bacterial toxins and antimicrobial resistance.

COb2: Describe air borne, food and water borne, zoonotic and sexually transmitted diseases.

COb3: Study of cells and organs of immune system.

COb4: Define and explain concepts of antigen and antibody, antigen-antibody reactions.

UNIT-1: MEDICAL BACTERIOLOGY

History of Medical Microbiology. Normal flora of human body, Host pathogen interactions. Bacterial toxins, virulence and attenuation. Antimicrobial resistance.

Air borne diseases - Tuberculosis, Anthrax.

- Food and waterborne diseases - Cholera, Typhoid.

Contact diseases - Syphilis. Gonorrhoea. General account of nosocomial infections.

UNIT-2: MEDICAL VIROLOGY AND PARASITOLOGY

Food and waterborne diseases - Poliomyelitis. Amoebiasis.

Insect borne diseases - Malaria, Dengue fever.

Zoonotic diseases — Rabies.

Viral diseases - Hepatitis B, HIV, SARS-COVID, MERS: Air borne diseases - Influenza.

UNIT-3: INTRODUCTION TO IMMUNOLOGY

History of immunology. Cells and organs of immune system - Primary and Secondary lymphoid organs. Functions of B&T Lymphocytes, Natural killer cells, Polymorphonuclear cells. Structure and classification of Antigens, Factors affecting antigenicity.

Antibodies - Basic structure. Types, properties and functions of Immunoglobulins.

Types of immunity - Innate and Acquired; Humoral and cell mediated immune response. Major

Histocompatibility Complex - Class 1 and 11

shaikh Akbar Siddique

M.Sc. NET, SET.

Assistant Professor & Head

Department of Microbiology,

Girra Govt. College,

Dr. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
GOVERNMENT COLLEGE FOR WOMEN
BEGUMPET-500016, T.S.

Dr. B. Bhama
Chairman, BOS
Dept. of Microbiology
Mania University, Hyd



UNIT-4: IMMUNOLOGICAL DISORDERS AND AG-AB REACTI ONS

Types of hypersensitivity - Immediate and delayed. Autoimmunity - Systemic and localized autoimmune disorders, Complement pathways – Classical and Alternate.

Types of Antigen-Antibody reactions- Agglutination, blood groups, precipitation, neutralization, complement fixation test. Labeled antibody based techniques-ELISA, RIA and Immunofluorescence; Polyclonal and monoclonal antibodies production and applications.

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.

MEDICAL MICROBIOLOGY & IMMUNOLOGY PRACTICALS

2HPW- Credits-1

1. Determination of blood grouping and RH typing.
2. Total count of RBC and WBC.
3. Differential count of blood leucocytes.
4. WIDAL test for typhoid (slide test) by Ag-Ab reactions
5. VDRL test for syphilis (slide test) by Ag-Ab reactions.
6. Ouchterlony double diffusion test
7. Separation of serum and plasma
8. IMViC test - Indole test, Methyl red test, Voges-Proskauer test, Citrate utilization test. Oxidase test, Catalase test.
9. Antibiotic sensitivity testing — Disc diffusion method

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Shaikh Akbar Siddique
M.Sc. NET, SET
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College

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CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE, O.U.
Hyderabad-500 001, T.S.

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Dr. B. Bhima
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyd.



References:

- Gopal Reddy, M., Reddy, M.N., Saigopal, DVR and Mallalah, K.V. (2007). *Laboratory Experiments in Microbiology*, Himalaya Publishing House, Mumbai.
- *Experiments in Microbiology* by K.R. Aneja.

Course Outcomes:

Students will be able to

- CO1: Summarize concepts of normal flora, bacterial toxins and antimicrobial resistance.
- CO2: Understand diseases transmitted through air, water, animals, hospitals and sexual contact.
- CO3: Basic knowledge about cells and organs of immune system.
- CO4: Acquaint knowledge about antigen, antibody, antigen-antibody reactions.

Dr. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O. U.
Hyderabad-500 001, T.S.

Dr. B. Dhima
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyd.

Shahik Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (A), Nizamabad

GOVERNMENT COLLEGE FOR WOMEN

BEGUMPET, HYDERABAD – 500016

(AUTONOMOUS)

DEPARTMENT OF MICROBIOLOGY

GE-1 5th semester

Title: Microbiology and Human health

4 HPW

Credits - 4

Overall Course Objective: Basic concepts of microbiology for for non-Microbiology students

Course Objectives:

COb1: Conceptual study about Contributions of scientists, morphology of bacteria, and staining methods.

COb2: Explain about good and bad microorganisms.

COb3: Discuss about concepts of immunology.

COb4: Provide information about hazards due to improper waste management.

UNIT-1: INTRODUCTION

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

Types of Microorganisms, Morphological characteristics of bacteria. Staining, cultivation methods of bacteria, culture media used for the growth of microorganisms.

UNIT-2 MICROORGANISMS GOOD AND BAD

Microorganisms related to human health. Normal microbial flora. Human microbiome concept. Bacterial disease: Typhoid, Tuberculosis, Syphilis.

Viral diseases: Flu, SARS, MERS, SARS-CoV-2, HIV

UNIT-3: IMMUNITY AND HEALTH

Introduction to immune system: Understaing the terms: Disease, infection, Pathogenicity, prophylaxis, Host resistance, Innate immunity and acquired immunity, Epidemics, Endemics and Pandemics: Importance of probiotics and vaccines for human health.

UNIT-4: WASTE MANAGEMENT AND HEALTH HAZARDS

Health hazards associated with dumpage of industrial and Biomedical waste. National and international guidelines for the disposal of waste. Guidelines of Central Pollution Control Board (CPCB). Safe disposal and pretreatment of wastes. Mechanical and chemical treatment of the waste, Autoclaving, incineration.

References:

1. Michael J. Pelczar, Jr. E.C.S.Chan, Noel R. Krieg Microbiology Tata McGraw- Hill

Shaikh Akbar Siddique
M.Sc. NET, SET

Assistant Professor & Head
Department of Microbiology
Girra Gout

CHANDRASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.
Hyderabad-500 001. T.S.

Dr. S. Bhima
Chairman, BoS
Dept. of Microbiology
Nizam University, Hyd.



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Scott, M.J., Harley, J.P. and Klein Microbiology 5th Edition, WCB Mc GrawHill, New York.

Digan, M.T., Martinkl, J.M and Parker, J. Broch Biology of Microorganism, 9th
n, MacMillan Press, England.

ie, R.C. and Maheshwari, D.K. General Microbiology S Chand, New Delhi.

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Outcomes:

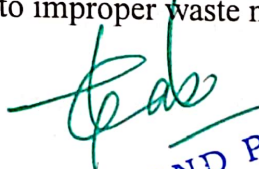
Student will be able to

Learn about basic concepts of Microbiology

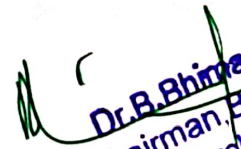
Understand good and bad bacteria and their mechanism

Acquaint knowledge about basic concepts of Immunology.

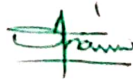
Summarize health hazards due to improper waste management.



DR. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.



Dr. B. Bhima
Chairman BOS
Dept. of Microbiology
Osmania University, Hyd.



Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology.
Girraj Govt. College (M), Nizamabad

GOVERNMENT DEGREE COLLEGE FOR WOMEN BEGUMPET
HYDERABAD.

(AUTONOMOUS) CBCS

DEPARTMENT OF MICROBIOLOGY

Semester -5

Code: BS

DSE-1A

Title: MOLECULAR BIOLOGY AND MICROBIAL GENETICS 4HPW-credits-4

Overall Course Objective: Detailed account on concepts of molecular biology and Microbial genetics.

Course Objectives:

COB1: Explain basic concepts DNA, its structure, replication, plasmids and transposons.

COB2: Overview of types of mutations, mutagens, DNA damage and repair mechanisms.

CO3: Provide outline of transcription, translation and operon concept.

CO4: Insight into basics of rDNA technology.

Title: MOLECULAR BIOLOGY AND MICROBIAL GENETICS 4HPW-credits-4

UNIT-1 MICROBIAL GENETICS

Fundamentals of Genetics - Mendian laws, Alleles, Crossing over and Linkage DNA and RNA as genetic material

Structure of DNA - Watson and Crick model-B, A & Z forms of DNA.

Extrachromosomal genetic elements - Plasmids and Transposons.

Replication of DNA - Semi conservative mechanism.

UNIT-2 MUTATIONS AND GENETIC RECOMBINATION

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 of 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 functions. tRNA

Outline of RNA transcription in prokaryotes.

Genetic Code, Structure of Ribosomes and brief account on protein synthesis.

Types of genes - Structural, Constitutive, Regulatory.

Operon concept, Regulation of gene expression in bacteria - Lac operon

UNIT-4 RECOMBINANT DNA TECHNOLOGY

Basic principles of genetic engineering - Restriction endonucleases, Reverse transcriptase, Alkaline phosphatase, DNA polymerases and Ligases, vectors.

Outline of gene cloning methods - random cloning, shot gun, PCR and cDNA.

Genomic and cDNA libraries-Construction and applications

General account on application of genetic engineering in Industry, agriculture and medicine. ✓

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Shaikh Akbar Siddique

M.Sc. NET, SET

Assistant Professor & Head

Department of Microbiology

Girraj Govt College (A), Nizampet

CHAND PASHA

Asst. Professor & Head

Dept. of Microbiology

NIZAM COLLEGE O. U.

Hyderabad-500 001. T.S.

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Dr. B. Bhima

Chairman, BOS

Dept. of Microbiology

Mania University, Hyd.



References:

1. Dr.Chand Pasha (2021). Text book of Molecular Biology and Microbial Genetics. Divya Lakshmi Publishers and Distributors, Meerut, UP.
2. Freifelder, D. (1997). Essentials of Molecular Biology, Narosa Publishing House, New Delhi.
3. Crueger. W. and Crueger. A. (2000). Biotechnology. A Text Book of Industrial Microbiology. Prentice-Hall of India Pvt. Ltd., New Delhi.
4. Glick. B.P. and Pasternack. J. (1998). Molecular Biotechnology. ASM press, Washington D.C., USA.
5. Friefelder. D. (1990). Microbial Genetics. Narosa Publishing House, New Delhi.
6. Strickberger, M.W. (1967). Genetics. Oxford and IBH. New Delhi.
7. John Cranon, David Freifelder, Stanly.R. Maloy. (2008) A Text book of Microbial Genetics, Narosa Publishing House, New Delhi.
8. Verma. P.S. and Agarwal, V.K. (2004). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S.Chand & Co.Ltd. New Delhi.

Molecular Biology and Microbial Genetics
PRACTICALS **2HPW**

- Colorimetric estimation of proteins by Biuret method.
- Colorimetric estimation of DNA by Diphenyl amine method.
- Colorimetric estimation of RNA by Orcinol method.
- Extraction of genomic DNA.
- Extraction of plasmid DNA
- Separation and observation of genomic DNA by Agarose gel Electrophoresis.
- Separation and observation of plasmid DNA by Agarose gel Electrophoresis.

References:

1. Experiments in Microbiology by K.R.Aneja.
2. Dr.Chand Pasha (2021). Text book of Molecular Biology and Microbial Genetics. Divya Lakshmi Publishers and Distributors, Meerut, UP.
3. Gopal Reddy, M.Reddy, M.N.Sai Gopal. DVR and Mallaiah K.V., Laboratory experiments in Microbiology.
4. Dubey, R.C. and Maheshwari D.K. Practical Microbiology. Jones and Barlett Publishers, USA.
5. Alcamo, L.E.Laboratory Fundamentals of Microbiology, Jones and Barlett publishers, USA.
6. Mahy. B.W.J. and Kangro, H.O. Virology - Methods Manual Academic Press. USA.
7. Burlson et al. Virology - A Laboratory Manual Academic Press, USA.

Course outcomes:

The student will be able to

- CO1: Get basic knowledge about concepts of DNA - its structure and replication
CO2: Summarize types of mutations and mutagens, DNA damage and repair.
CO3: Conceptual understanding of transcription, translation and operon.
CO4: Acquaint knowledge about basics of rDNA technology.


Shaikh Akbar Siddique

M.Sc. NET, SET

Assistant Professor & Head

Department of Microbiology

Girraj Govt. College (A), Nuzamabad


Dr. B. Bhima
Chairman, BoS
Dept. of Microbiology
Osmania University, Hvt

GOVERNMENT DEGREE COLLEGE FOR WOMEN BEGUMPET
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(AUTONOMOUS) CBCS

DEPARTMENT OF MICROBIOLOGY

Semester -5

Code: BS

DSE-1B

Title: MICROBIAL OMICS

4HPW-credits-4

Overall Course Objective: To give basic knowledge about microbial omics.

Course Objectives:

COB1: Explain basic concepts of multi omics approach, genomics, transcriptomics, proteomics and next generation sequencing methods.

COB2: Discuss structure, its prediction, protein markers, clinical proteomics and protein engineering.

COB3: Conceptual study of mutagenesis, genome annotation, and its applications, microbial genome projects.

COB4: Introduction to concepts of bioinformatics such as databases, alignment, and sequencing methods.

Title: MICROBIAL OMICS

4HPW-credits-4

UNIT-1 INTRODUCTION TO OMICS

Introduction to molecular biology. Structure of DNA, RNA. Multi omics approach for analysis of Microbial biology; Genomics, Transcriptomics (RNA-Seq). Proteomics. Metabolomics. Metagenomics and their applications. Basic concepts in high throughput sequencing or Next Generation Sequencing methods for use in food-microbiology, diagnostics and Human health.

UNIT-2: PROTEOMICS

Protein structure - Different levels of protein structure. Protein folding and unfolding. Protein secondary and 3D structure prediction methods. X-ray crystallography, NMR and homology modelling. Protein micro arrays - Protein markers, Clinical Proteomics, Protein engineering, Proteomic strategies in Cancer, Prions.

UNIT-3: GENOMICS

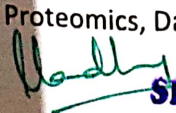
An Introduction of functional genomics; Site-directed mutagenesis. Transposon mutagenesis, DNA microarray. RNA interference and Chromatin immune precipitation. Genome annotation. Applications of functional genomics in vaccine and drug designing. Genome editing tools such as CRISPR/Cas 9. Databases of Microbial Genomics: Microbial Genome projects.

UNIT-4: BIOINFORMATICS

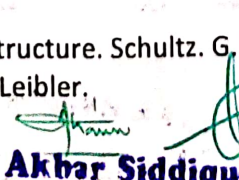
Introduction to Bioinformatics and Molecular Databases. Primary Databanks - NCBI. EMBL. DDBJ: Secondary Databases UNIPROT: Structural Database - PDB: Database similarity search (FASTA, BLAST): Alignment: Pairwise and Multiple sequence alignment. Whole genome sequence: Genome annotation and Gene prediction: Primer Designing: Phylogenetic analysis and Tree Construction.

References:

1. Principles of Protein structure. Schultz. G. E., and Schirmer. R.H. Dr. ShaktiSahi.
2. Proteomics, Daniel C. Leible.


Shaikh Akbar Siddique

M.Sc. NET, SET
Assistant Professor & Head


CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
M. COLLEGE O.U.
ad-500 001. T.S.


Dr. B. Bhima
Chairman, BOS
Dept. of Microbiology
University, Hyd



3. Microbial Proteomic., MarjoPoutanen.
4. Proteins: Structures and Molecular Principles (2nd ed.), TE Creighton.
5. Organic Spectroscopy, William Kemp.
6. Proteome Research: Two-Dimensional Gel Electrophoresis an Detection Methods (Principles and Practice), T.Rabilloud (Editor), 2000, Springer Verlag.
7. Introduction to Protein Architecture: The structural Biology of Proteins. M.Lesk. 2001, Oxford University Press.
8. Molecular Biotechnology by Bernard R.Glick and Jack. J. Pasternak.
9. DNA Microarrays ED.M.Schena.

MICROBIAL OMICS PRACTICALS

1. Protein isolation from E.coli.
2. Sequence analysis of proteins (by BLAST, Clustal W and Phylip).
3. Protein structure prediction by Homology modelling.
4. Isoaltion of Genomic DNA from E.coli and its demonstration by OD and agrose electrophoresis.
5. Isolation of plasmid DNA from E.coli and its demonstration by OD and agarose electrophoresis.
6. DNA molecular size determination.
7. Primer designing using online software.
8. PCR amplification of genes and detection of amplicon by agarose gel electrophoresis.

References:

1. Molecular Biotechnology by Chanarayappa.
2. Methods in Molecular cloning by Sambrook.
3. Gopal Reddy., M. Reddy.M.N., Saigopal. DVR and Mallaiah. K.V. (2007). Laboratory experiments in Microbiology. 2nd Edition. Himalaya Publishing House, Mumbai.

Course Outcomes:

The student will be able to

CO1: Understand Protein isolation, its sequencing, protein structure prediction by homology modeling.

CO2: Practically demonstrate isolation of Genomic and Plasmid DNA, its demonstration by OD and agarose electrophoresis.

CO3: Acquaint knowledge about Primer designing online software, molecular size determination and PCR amplification of genes and its detection.

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DR. CHAND PASHA
 Asst. Professor & Head
 Dept. of Microbiology
 NIZAM COLLEGE O.U.
 Hyderabad-500 001. T.S.

[Handwritten signature]
Shaikh Akbar Siddique
 M.Sc. NET, SET.
 Assistant Professor & Head
 Department of Microbiology,
 Girraj Govt. College (A), Nizamabad

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Dr.B.Bhima
 Chairman,BoS
 Dept.of Microbiology
 Osmania University,Hyd



GOVERNMENT DEGREE COLLEGE FOR WOMEN BEGUMPET
HYDERABAD.
(AUTONOMOUS) CBCS
DEPARTMENT OF MICROBIOLOGY

Title: INDUSTRIAL MICROBIOLOGY

VI Semester

Code: B5

DSE-2A

4HPW-credits-4

Overall course objective: To provide outline of usage of microorganisms in Industries.

COB1: Insight into different microbes used in industries, culture maintenance, inoculation and strain improvement strategies.

COB2: Explain basic concepts of fermentation like fermentor design, types, upstream and down stream processing methods.

COB3: Discuss different types of fermentations.

COB3: Provide outlines of fermented food products and industrial production of vitamins, vaccines, beverages, biofuels, amino acids and organic acids, and disposal of industrial waste.

UNIT-1: MICROORGANISMS AND SELECTION

Introduction to industrial Microbiology, Microorganisms of industrial importance - Yeast, Molds, Bacteria, Actinomycetes. Screening - primary and secondary screening; screening and selection of industrially useful microbes. Steps to maintain seed culture and inoculation strategies for enhanced product yield. Strain improvement strategies. Immobilization methods - absorption and entrapment.

UNIT-2 FERMENTATION

Design of bioreactor. Physico-chemical standards used in bioreactors. Limitations of bioreactor. Fermentation equipment and its use. Design of fermentor, type of fermenter, agitation, aeration, antifoam, pH and temperature control. Stages of fermentation process. Inoculation media and fermentation media: Raw materials used in fermentation industry and their processing. Downstream processing.

UNIT-3 TYPES OF FERMENTATION

Types of fermentations: Batch, Fed batch, continuous types and kinetics. Submerged, surface, solid state, dual and multiple fermentations. Advantages and disadvantages of solid substrate and liquid fermentations. Common Microbial fermentation - alcohol and lactic acid fermentation.

UNIT-4 MICROBIAL PRODUCTS

Industrial products derived from microbes: vitamins-B12: Vaccines-recombinant vaccines, production of beverages (beer and wine), biofuels (biogas and methane), enzymes (amylase), antibiotics (penicillin, streptomycin), amino acids (glutamic acid), organic acid (citric acid). Disposal of industrial waste.

References:

1. Patel, A.H. (1984). Industrial Microbiology, Mac Milan India Ltd. Hyderabad.

Handwritten signature
Jhaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girra Govt. College (A), Nizamabad

Handwritten signature
CHAND PISHA
Asst. Professor & Head
Dept. of Microbiology,
NIZAM COLLEGE O.U.,
Hyderabad-500 001, T.S.

Handwritten signature
Dr. B. Bhima
Chairman, BoS
Dept. of Microbiology,
University, Hyd



2. Cassida, L.E. (1968). Industrial Microbiology. Wiley Eastern Ltd. & New Age International Ltd., New Delhi.
3. Crueger, E. 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 SingaraCharya, 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.

INDUSTRIAL MICROBIOLOGY

PRACTICALS

2HPW - Credits -1

1. Screening for amylase producing microorganisms.
2. Screening for organic acid producing microorganisms.
3. Estimation of Ethanol by potassium dichromate method.
4. Production of citric acid by submerged fermentation.
5. Estimation of citric acid by titrimetry method.
6. Estimation of penicillin
7. Bacterial slides - Bacillus, Lactobacillus, Yeast, Aspergillus, Penicillium.

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. Reddy, G. (Ed.) (1987). Prescott & Dunn's Industrial Microbiology, 4th Edition. CBS Publishers and Distributors, New Delhi.
5. Reddy, S.R. and SingaraCharya. M.A. (2007). A Text book of Microbiology. Applied Microbiology, Himalaya Publishing House, Mumbai.
6. Demain, A.L. Davies. J.E.(1999). Manual of Industrial Microbiology and Biotechnology, ASM Press, Washington, D.C., USA.

Course Outcomes:

The student will be able to

CO1: Understand selection and screening of microorganisms of industrial importance.

CO2: Get basic knowledge about fermentor, media, upstream and down stream processing.

CO3: Understand types of fermentations.

CO4: Acquaint knowledge about production of some industrially important products.

Reddy
Shaikh Akbar Siddique
 M.Sc. NET. SET. CHAND PASHA
 Assistant Professor & Head
 Department of Microbiology
 Girraj Govt. College, Hyderabad
 NIZAM COLLEGE O.U.
 Hyderabad-500 001. T.S.

Dr. B. Bhima
Dr. B. Bhima
 Chairman, BoS
 Dept. of Microbiology
 Osmania University, Hyd.



GOVERNMENT DEGREE COLLEGE FOR WOMEN BEGUMPET
HYDERABAD.

(AUTONOMOUS) CBCS

DEPARTMENT OF MICROBIOLOGY

Title: PHARMACEUTICAL MICROBIOLOGY

VI Semester

Code: BS

DSE-2B

4HPW-credits-4

Overall Course objective: To understand basic concepts of pharmaceutical microbiology

Course objectives:

COB1: Explain basic concepts of chemotherapy and development of synthetic drugs.

COB2: Discuss about antibiotics and principles of chemotherapy.

COB3: Conceptual study of drug resistance and its mechanism.

COB4: Overview of microbiological assays.

Unit-1: INTRODUCTION TO CHEMOTHERAPY

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.

Unit-2: ANTIBIOTICS

The origin, development and definition of antibiotics as drugs, types of antibiotics and their classification. Non-medical uses of antibiotics. 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-3: DRUG RESISTANCE

The phenomenon of drug resistance, clinical basis of drug resistance, biochemistry of drug resistance, genetics of drug resistance in bacteria.

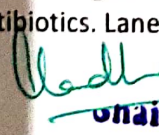
Mode of action of important drugs - Cell wall inhibitors (Beta-lactam e.g. Penicillin), membrane inhibitors (polymyxins), macromolecular synthesis inhibitors (Streptomycin), antifungal antibiotics (nystatin).

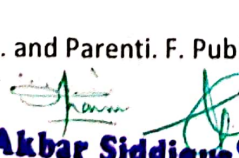
Unit-4: MICROBIOLOGICAL ASSAYS

Assays for growth promoting substances, nutritional mutants and their importance. Drug sensitivity 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. Biochemistry of antimicrobial action. Franklin, D.J. and Snow, GA. Pub Chapman & Hall.
4. Antibiotics and Chemotherapy, Garrod, L.P., Lambert, HP and C. Grady, F. (eds). Publ: Churchill Livingstone.
5. Antibiotics. Laneini. G. and Parenti. F. Publ: Springer, Verlag. The Molecular Basis of


Naikh Akbar Siddique
M.Sc. NET, SET
Assistant Professor & Head
Department of Microbiology,
Girai Govt. College, Hyderabad


CHAND PRASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.


Dr. B. Bhima
Chairman, BOS
Dept. of Microbiology
Osmania University, Hyd



antibiotic action. Gae.Ef. et al. Publ: Wiley, New York.

6. Antimicrobial Drug action, Williams, RAD., Lambart, P.A. and Singleton, P. Pub: Bios Sci., Microbiological Assays, Hewitt.

PHARMACEUTICAL MICROBIOLOGY

PRACTICALS

2HPW - CREDITS-1

1. Tests for disinfectants (Phenol coefficient/RWC)
2. Determination of antibacterial spectrum of drugs or antibiotics.
3. Chemical assays for antimicrobial drugs.
4. Testing of antibiotic or drug sensitivity or resistance.
5. Determination of MIC for antimicrobial compounds.
6. Microbiological assays for antibiotics (Liquid tube assay, agar tube assay, agar plate assays).

Reference Books:

1. Disinfection, sterilization and preservation Block, S.S. (ed). Lea and Febigor, Baltimore.
2. Pharmaceutcal Microbiology, Hüge. W.B. and Russel, AD. Blackwell Scientific. Oxford
3. Inhibition and destruction of microbial cell by Hugo, WB (ed.) Pub: Academic press, New York.
4. Manual of clinical Microbiology, Lennette, EH. (ed) Pub: American Society for Microbiology, Washington.
5. Principles and practices of disinfection. Russell, AP., Hugo, WB., and Ayliffe, GAJ (eds) Publ. Blackwell Sci.
6. Biochemistry and antimicrobial action. Franklin. D.J. and Snow. GA Pub. Chapman & Hall.
7. Antibiotics and Chemotherapy, Garrod, L.P., Lambert, HP and C. Grady, F. (eds). Publ: Churchill Livingstone.
8. The Molecuar Basis of antibiotic action. Ga.E. EF et al. Publ: Wiley, New York.
9. Antimicrobial Drug action, Williams, RAD., Lambart, P.A. and Singleton, P. Pub: Bios Sci., Microbiological Assays, Hewitt.

Course Outcomes:

The student will be able to

CO1: Understand the basic concepts of chemotherapy.

CO2: Learn about antibiotics and their usage.

CO3: Acquire knowledge about drug resistance and its mechanism.

CO4: Illustrate microbiological assays.

DR. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.

Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girraj Govt College (W), Nizamabad

Dr. B. Shima
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyd.



GOVERNMENT DEGREE COLLEGE FOR WOMEN BEGUMPET
HYDERABAD.
(AUTONOMOUS) CBCS

DEPARTMENT OF MICROBIOLOGY

Title: APPLIED MICROBIOLOGY

VI Semester

Code: BS

DSE-3

4HPW-credits-4

Overall course objective: To understand applications of microbiology in agriculture, industries and health departments.

Course objectives:

COB1: Study of concepts like strains, culture collection centres, patenting process, and biofertilizers.

COB2: Describe metabolic engineering aspects for microbial products.

COB3: Discuss concepts of diagnostic microbiology like sample collection, staining, rapid detection of pathogens.

COB4: Insight into concepts like hospital acquired infections, sanitation in community and biohazard disposal.

APPLIED MICROBIOLOGY

VI Semester

UNIT-1 MICROBIAL PRODUCTS FOR SMALL SCALE ENTREPRENEURS

Maintenance of type strains or reference strain of microorganisms: culture collection centres (MTCC, ATCC), Patenting process and IPR, Microorganisms in agriculture. Nitrogen fixation and phosphate solubilization. Biofertilizers - production of Azolla, Rhizobium and Mycorrhizae. Biofungicides - Mass production of Trichoderma and Pseudomonas. Biopesticides - Bacterial, fungal and viral.

UNIT-2 METABOLIC ENGINEERING FOR MICROBIAL PRODUCTS

Production of microbial pigments (prodigiosin, violacein, monascin). Bacterial and algal carotenoids. Microorganisms for flavor and aroma production. Biotransformation and metabolic engineering of microorganisms to produce compounds such as esters, terpenes, aldehydes, lactones, geosmin, vanilla and coumarin.

UNIT-3 MICROBIAL DIAGNOSTICS AND HEALTH

Diagnostic microbiology: Collection, transport and culturing of clinical samples. Preparation and use of culture media for detection of microbial pathogens. Examination of sample by staining - Gram stain. Ziehl-Neelsen staining for tuberculosis. Blood smear for malarial parasite. Serological methods for rapid detection of bacterial, fungal and viral pathogens. Techniques used for the diagnosis of hospital acquired infections and multi drug resistant microorganisms. Monitoring of sanitation in community - Biohazard disposal.

References:

1. Stanbury, P.F., Whitaker, A. and Hall, S.J. (1997). Principles of Fermentation technology, Aditya Books (P) Ltd. New Delhi.
2. Rangaswami, G. and Bhagyaraj, D.J. (2001). Agricultural Microbiology, 2nd Edition, Prentice Hall of India, New Delhi.


Shaikh Akbar Siddique
M.Sc. NET, SET
Assistant Professor & Head
Department of Microbiology


Deb Bhima
Chairman, BoS
Dept. of Microbiology
University, Hyd



3. Atlas, R.M. and Bartha, R. (1998). Microbial Ecology - Fundamentals and Applications, Addison Wesley Longman, Inc., USA.
4. Ananthanarayan R and Paniker CKJ (2009). Textbook of Microbiology, 8th Edition, Universities Press Private Ltd.
5. Brooks G.F., Carroll K.C. Butel J.S., Morse S.A. and Mietzner, T.A. (2013)

APPLIED MICROBIOLOGY

PRACTICALS

2HPW-Credits -1

1. Isolation and enumeration of Rhizosphere microorganisms.
2. Isolation of Rhizobium from leguminous root nodules.
3. Staining and observation of mycorrhizal fungi.
4. Mass production of Rhizobium, Mycorrhizae, Trichoderma and Pseudomonas using different carriers or substrates and methods to assay quality control of bioproducts.
5. Gram's staining.
6. Ziehl-Nielsen staining.
7. Blood smear.

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 and Co. New Delhi.
3. Atlas, R.M. and Bartha.R. (1998). Microbial Ecology - Fundamentals and Applications, Addison Wesley Longman. Inc., USA.

Course outcomes:

The student will be able to

CO1: Understand basic concepts of culture collection, patenting, biofertilizers and biopesticides.


CO2: Illustrate metabolic engineering methods.

CO3: Learn about different concepts of diagnostic microbiology

CO5: PRACTICALS: Skills of isolating rhizosphere microorganisms, Rhizobium can be learnt.

CO6: PRACTICALS: Can learn about mass production of Mycorrhizae, Trichoderma and Pseudomonas.

CO7: PRACTICALS: Can learn about staining techniques like Gram's staining, Ziehl-Nielsen staining, and staining of blood smear.


Shaikh Akbar Siddique
 M.Sc. NET, SET
 Assistant Professor & Head
 Department of Microbiology,
 Girraj Govt. College (A), Nizamabad


CHAND PASHA
 Professor & Head
 Dept. of Microbiology
 ZAM COLLEGE, O.U.
 Hyderabad-500 001. T.S.


Dr. B. Bhima
 Chairman, BoS
 Dept. of Microbiology
 Osmania University, Hyd



GOVERNMENT DEGREE COLLEGE FOR WOMEN BEGUMPET
HYDERABAD,
(AUTONOMOUS) CBCS
DEPARTMENT OF MICROBIOLOGY

Title: PROJECT
Code: BS

DSE-3

VI Semester
SHPW-credits-4

1. Number of students who will be offered project work will vary batch to batch depending upon the infrastructure facilities and may vary each year (not exceeding 5 per group).
2. Project work will involve experimental work and the student will have to complete this in stipulated time.
3. The final evaluation of the project will be through a panel involving internal and external examiners.
4. Students will be asked their choice for project work at the beginning of VI semester and all formalities of topic and mentor selection will be completed.
5. Project work will be offered in lieu of expertise and infrastructural facilities of the department and will be evaluated for 4 credits.
6. The distribution of marks for project will be:
Project work: 100 Marks (60 marks for dissertation + 40 marks for presentation and viva).

Dr. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.

Dr. B. Shama
Chairman, BOS
Dept. of Microbiology
Osmania University, Hyd.

Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (A), Nizamabad

**Government Degree College for Women, (Autonomous),
Begumpet, Hyderabad.
Dept. of Microbiology
List of Panel of Examiners For Microbiology B.Sc. -I, II, III Year (2021-22)**

S. No.	Name of Examiner	Designation	College/Inst.	Teaching experience
1.	Dr. Vindhya Vasini Roy	HOD, Department of Microbiology.	St. Pious X Degree & PG college, Nacharam. Ph:9000207197	34 years
2.	Dr. K. Anuradha	HOD, Department of Microbiology.	Bhavan's Vivekananda College, Sainikpuri. Ph: 9849977396	25 years
3.	Ms. J. Sridevi	HOD, Department of Microbiology.	Indira Priyadarshini Govt. Degree College Ph: 7331128164	10 years
4.	Ms. K. Kusuma	Lecturer in Microbiology.	Kasturba Gandhi Degree and PG college, Marredpally, Sec'Bad Ph:	20 years
5.	Ms. I. Marian Rajani	HOD, Department of Microbiology.	GDC (W), Hussainialam, Hyderabad. Ph: 9030078206	17 years
7.	Dr. Hari Krishna N	HOD, Department of Microbiology,	Government Degree College, Gajwel Ph: 9966222110	10 years
8.	Dr.K.Jyothi	HOD, Department of Microbiology	Tara Government Degree College, Sangareddy Ph: 7569350325	10 years
9.	Ms. Archana Mary	HOD, Department of Microbiology	GDC (W) Khairatabad Ph: 9703899099	11 years

Chairman, BoS
Osmania University

Sham
Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (W), Nizambad

Madly
Chand Pasha
DR. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.

Dr. B. Bhima
Dr. B. Bhima
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyd

GOVERNMENT DEGREE COLLEGE FOR WOMEN, AUTONOMOUS
BEGUMPET, HYDERABAD

Re-Accredited with 'B+' Grade by NAAC

DEPARTMENT OF MICROBIOLOGY

BOARD OF STUDIES MEETING FOR THE YEAR 2021-22

The Board of studies meeting for the Department of Microbiology is held on: 8/10/21

The following members were present in the meeting:

01. Dr. A. Madhuri - Chairperson BOS

Assistant professor & Head,

Department of Microbiology

GDC(w) Begumpet

02. Dr. B. Bhima

Chairperson BOS, University Nominee,

Osmania University

03. Dr. Chand Pasha - Subject Expert

Senior Assistant Professor of Microbiology,

Nizam College, Hyderabad.

04. Shaikh Akbarpasha - Subject Expert

Assistant Professor and Head,

Department of Microbiology,

Girraj Govt. College (A), Nizamabad.

05. Dr. E. Prasad - Representative from Industry

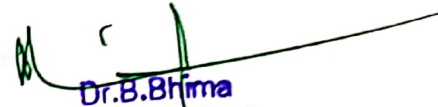
Senior Scientist, Fermentation technology development center,

Dr. Reddy's Laboratories, Hyderabad

06. Ms. Radhika - Alumnus

M.Sc., Lecturer, Hindu Degree College,

Sanathnagar, Hyderabad



Dr. B. Bhima
Chairman, BoS
Dept. of Microbiology
Osmania University



DR. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.



Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology.
Girraj Govt. College (A), Nizamabad

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Department of Microbiology,
Girraj Govt. College (A), Nizamabad.

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Dr. Reddy's Laboratories, Hyderabad

06. Ms. Radhika - Alumnus

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Sanathnagar, Hyderabad

Dr. B. Bhima
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Dept. of Microbiology
Osmania University

Dr. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.

Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (A), Nizamabad

GOVERNMENT DEGREE COLLEGE FOR WOMEN BEGUMPET-HYDERABAD
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DEPARTMENT OF MICROBIOLOGY

B.SC. III YEAR

QUESTION PAPER PATTERN FOR INTERNAL ASSESSMENT EXAMINATION

DSC, DSE, Generic Elective

Time: 1 Hr.


Max.Marks: 40

Internal assessment

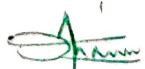
- 2 internals of 20 marks each. Average of the 2 internals is considered for computation of internal marks.
- 10 Marks for unit wise exam (20 objective type questions X 1/2 marks = 10)
- 5 Marks for seminar and group discussion.
- 5 Marks for assignment.

Internal exam consists of 20 marks. In section-A, 2 short answer type questions of 5 marks to be answered out of 4 (2x5=10). In section-B, 1 question has to be answered with internal choice and carries 10 marks.


Dr. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.


Dr. B. Bhama
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyd

Sign of B.O.S.


Shaikh Akbar Siddique
M.Sc., NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (W), Hyderabad

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DEPARTMENT OF MICROBIOLOGY

III Year

Theory Model Question Paper

For DSC & DSE, Generic Elective

Time: 3 hrs

Max. Marks: 60

Draw well-labeled diagrams wherever necessary

I. Write short answer for any 5 of the following 5 X 4 = 20M

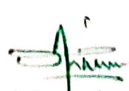
- | | |
|----|----|
| a. | e. |
| b. | f. |
| c. | g. |
| d. | h. |

II. Essay Questions: 4X 10 = 40M

- a. (OR) b.
- a. (OR) b.
- a. (OR) b.
- a. (OR) b.




DR. CHAND PASHA
Asst. Professor & Head
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NIZAM COLLEGE O. U.
Hyderabad-500 001, T.S.


Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (A), Nizamabad

Sign. of BoS:


Dr. B. Bhima
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyderabad



GOVERNMENT DEGREE COLLEGE FOR WOMEN, BEGUMPET-HYDERABAD.

(AUTONOMOUS)CBCS

DEPARTMENT OF MICROBIOLOGY

B.Sc.II & III year SKILL ENHANCEMENT COURSES

Common Question paper Pattern

Maximum Marks: 50

Internal Assessment/Project work: 10 Marks

End Semester Examination: 40 Marks

SECTION-A

(Short Answer type)

Answer any FOUR from the following:

4x4=16M.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

SECTION-B.

(Long Answer type)


Answer ONE from each unit:


2x12=24M

I.(A) OR (B)

II.(A) OR (B)

Sign of B.O.S.


DR. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.


Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology,
Girraj Govt. College (W), Nizamabad


Dr. B. Bhima
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyd.



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DEPARTMENT OF MICROBIOLOGY

Practical Model Paper

ME:3 Hours

Max. Marks: 50

1. Experiments

A. Major Experiment	20 M
B. Minor Experiment	10 M
I. Spotters (C, D, E, F, G)	5X2=10 M
II. Viva	5 M
III. Record	5 M

DR. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.U.
Hyderabad-500 001. T.S.

Sign of B.O.S

Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology
Girraj Govt. College (W), Hyderabad

Dr. B. Bhama
Chairman, BoS
Dept. of Microbiology
Osmania University, Hyderabad

GOVERNMENT DEGREE COLLEGE FOR WOMEN, AUTONOMOUS,
BEGUMPET, HYDERABAD
Department of Microbiology
RESOLUTIONS OF B.O.S. MEETING

A meeting of Board of Studies of Department of Microbiology, GDC(W) Begumpet, Hyderabad, was held on: _____ The members discussed elaborately B.Sc. Syllabus (CBCS) to be implemented in the academic year 2021-22.

The following resolutions were taken in the meeting:

1. Reapproved the adopted CBCS syllabus prescribed by Osmania University with flexibility for Autonomous colleges, for I, II, III and IV Semesters along with SEC I,II,III and IV.
2. Approved final year syllabus with examination pattern of 60+ 40

Code	Paper/Title	Course Type	HPW	Credits
THIRD				YEAR
SEMESTER - V				
BS	GE-1: Microbiology and Human Health	GE-1	4T	4
BS	DSE -1A: Molecular Biology and Microbial Genetics DSE -1B: Microbial Omics	DSE-1A / DSE-1B /	4T+2P	4+1=5
THIRD				YEAR
SEMESTER - VI				
BS	DSE-3: Project (Group projects)/ Applied Microbiology	PROJECT	4	4
BS	DSE -2A: Industrial Microbiology DSE -2B: Pharmaceutical Microbiology	DSE-2A / DSE-2B /	4T+2P=6	4+1=5

* Any one elective can be chosen out of Electives I & II for each semester (V & VI)

* Generic Elective is Interdisciplinary hence students other than life sciences courses will be offered.

Examination Pattern for III year: Maximum Marks: 100.

External Exam: 60, Internal Exam: 40.

5. It is resolved to conduct TWO internal assessments for 40 Marks (Written test 20M, seminar/ Quiz/ Group Discussion-5M, Assignment 5 M, MCQ Test 10 M (Unit Test 20 objective type questions after completion of each unit, average of 4 tests to be given -10 M) during each semester and have average of two internals to be considered as Internal marks for semester results.
6. Maximum marks for end semesters examination is 60 Marks and the pattern is:
Section-A: Four questions. Long Answer type. One compulsory from each Unit. 4x10=40M.
Section-B: Five questions Short answer type out of Eight 5 x 4 = 20 M
7. It is resolved to conduct practical examination at the end of each semester for a maximum of 50 Marks each.
8. The Board approved the panel of examiners which was provided by the college.

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Dr. CHAND PASHA
Asst. Professor & Head
Dept. of Microbiology
NIZAM COLLEGE O.H.
Hyderabad - 500 001, T

[Handwritten signature]
Shaikh Akbar Siddique
M.Sc. NET, SET.
Assistant Professor & Head
Department of Microbiology

[Handwritten signature]
Dr. B. Bhima
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Dept. of Microbiology
Osmania University, Hy