

SantGadge Baba Amravati University, Amravati

NEP Syllabus

UG Programme

Faculty: Science and Technology

Programme: B.Sc.

Subject: Microbiology

Course :B.Sc I Semester I : Open Elective

FACULTY: Science and Technology

Teaching and Learning Scheme: for the Degree of Bachelor of Science

(Three Years- Six Semesters Bachelor's Degree Programme)

Level	Semester	Course code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum marks
4.5	I	127202	Communicable diseases and their Control	2	30	2Hrs	30
		127203	Food Preservation and Food Safety	2	30	2 Hrs	30

Level	Semester	Course code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum marks
4.5	I	127202	Communicable diseases and their Control	2	30	2Hrs	30

127202 Open elective: Communicable diseases and their Control				
COURSE Objectives:	To understand the role of different microorganisms in disease formation To apply this knowledge to control infectious diseases.			
Course Outcomes	Upon completion of this course successfully, students would be able to <ol style="list-style-type: none"> 1. Acquire knowledge about vectors that transmit diseases 2. Know how the diseases spread in the community 3. Understand occurrence of symptoms in diseases 4. Know the methods of prevention of spread of diseases in community 5. Control of disease agent and hence diseases 			
Unit System	Contents	Workload Allotted in hours	Weightage of Marks Allotted	Pedagogy
Unit I Water born and Food borne diseases	1. Communicable diseases: Definition-Microorganisms, infection, pathogenicity, vector, communicable and non communicable diseases, 2. Water borne diseases a. Causes, symptoms and prevention of following i. Typhoid fever ii. Cholera iii. Dysentery iv. Hepatitis- A 3. Food borne diseases	8 Hrs	8 Mks	Chalk & Board, Power Point Presentation, Videos

	<p>a. Causes, symptoms and prevention of following</p> <p>v. Staphylococcus food poisoning</p> <p>vi. Clostridium botulism food poisoning</p> <p>vii. Salmonella food poisoning</p> <p>4. Control of water borne and air borne diseases</p>			
Unit II Air borne diseases	<p>1. Air borne diseases</p> <p>a. Causes, symptoms, prevention and control of following</p> <p>i. Diphtheria</p> <p>ii. Tuberculosis</p> <p>iii. Pneumonia</p> <p>iv. Aspergillosis</p> <p>v. Chicken pox</p> <p>vi. Measles</p> <p>vii. Herpes</p>	7 Hrs	7 Mks	Chalk & Board, Power Point Presentation, Videos
Unit III Diseases transmitted through Arthropod vectors and Zoonotic diseases	<p>1. Arthropod vector borne diseases</p> <p>a. Causes, symptoms and prevention of following</p> <p>i. Dengue</p> <p>ii. Malaria</p> <p>iii. Yellow fever</p> <p>iv. Typhus fever</p> <p>b. Control of arthropod borne diseases</p> <p>c. What are zoonotic diseases</p>	8 Hrs	8 Mks	Chalk & Board, Power Point Presentation, Videos

	<p>i. Rabies</p> <p>d. Control of Zoonotic diseases</p>			
<p>Unit IV</p> <p>Contagious diseases</p>	<p>1. Contagious diseases</p> <p>a. Causes, symptoms and prevention of following</p> <p>i. Dermatophytosis</p> <p>2. Control of Contagious diseases</p> <p>3. Sexually transmitted diseases</p> <p>a. What are Sexually transmitted diseases</p> <p>b. Causes, symptoms and prevention of following</p> <p>i. HIV/AIDS</p> <p>ii. Gonorrhoea</p> <p>iii. Syphilis</p> <p>4. Control of sexually transmitted diseases</p>	7 Hrs	7 Mks	Chalk & Board, Power Point Presentation, Videos

Model Questions	<ol style="list-style-type: none"> 1. Explain symptoms and prevention of Cholera 2. Explain symptoms and prevention of <i>S. aureus</i> food poisoning 3. Explain symptoms and prevention of Diphtheria 4. Explain symptoms and prevention of Tuberculosis 5. Explain symptoms and prevention of Pneumonia 6. Explain symptoms and prevention of Herpes 7. Explain symptoms and prevention of Dengue 8. Explain symptoms and prevention of Typhus fever 9. What are the zoonotic diseases 10. How will you control Zoonotic diseases 11. Define sexually transmitted diseases, and explain causes and control of AIDS 12. Explain causes and control of Syphilis
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Books for reference:

- Communicable Disease: Epidemiology and Control: Norman Noah and Mary O'Mahony
- Control of Communicable Disease: A. S. Beneson
- Controlling Communicable Disease (Understanding Public Health): Norman Noah
- Disease Control Priorities in Developing Countries (Oxford Medical Publications): Dean T Jamison
- Infectious Diseases of Humans: Dynamics and Control: Roy M Anderson and Robert M May
- Microbiology and infectious diseases by: Kenneth D. Somers, Stephen A. Morse
- Medical Bacteriology: Dey N.C. & Day T.K.
- Medical Microbiology Vol. I & II : Cruickshank K.R.

- Text Book of Microbiology : Ananthanarayan R. & C.E. Panikar
- Dorland's Pocket Medical Dictionary
- Preventive & Social Medicine : Park & Park
- Medical Microbiology : R. Anantnarayan
- Fundamental Priciplesof :A.J.Salle. Bacteriology
- Microbes & Diseases of Man: W.C. Deb.

Level	Semester	Course code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum marks
4.5	I	127203	Food Preservation and Food Safety	2	30	2Hrs	30

127203 Open elective : Food Preservation and Food Safety				
COURSE Objectives:	<ul style="list-style-type: none"> To understand the role of different microorganisms in food spoilage To apply this knowledge to control food borne diseases. 			
Course Outcomes	<p>Upon completion of this course, students would be able to</p> <ul style="list-style-type: none"> Asses the spoilage of various food. Apply the knowledge of food preservation in day-to-day life. Use the knowledge of food safety rules and regulations for work related with food service unit. 			
Unit System	Contents	Workload allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit-I Food spoilage	<ol style="list-style-type: none"> Introduction of food spoilage and its type. Causes of food Spoilage: Bacteria, Protozoa and Fungi. Factors affecting the spoilage of food such as temperature, ph, types of food and its contents. Symptoms & Consequence of food spoilage. Methods for detection of food spoilage 	8 hrs	8 marks	Chalk & Board, GD, Power point presentation, Charts, Video & Assignments.
Unit-II Food Hygiene and Food born diseases	<ol style="list-style-type: none"> Concept of food hygiene Principles of Hygiene and Sanitation in Food Service unit. Measures for food hygiene and safe food handling procedures. Causes, symptoms, prevention and control of following food borne diseases 	7 hrs	7 marks	Chalk & Board, Power point presentation, Charts,

	<ul style="list-style-type: none"> i. Staphylococcus food poisoning ii. Clostridium botulism food poisoning iii. Campylobacter jejuni iv. Salmonella food poisoning 			Projects, Video & Assignments.
Unit-III Food preservation	<ul style="list-style-type: none"> 1. Concept of food preservation. 2. Principle and Need of Food Preservation 3. Methods for preservation- Freezing, Boiling, Salting, Sweetening, Dehydration. 4. Modern industrial methods for preservation- Vacuum-packing / Canning, Pasteurization, Artificial food additives/Chemical preservatives, Irradiation of food 	8 hrs	8 marks	Chalk & Board, Power point presentation, Charts, Projects, Video & Assignments
Unit-IV Food safety	<ul style="list-style-type: none"> 1. Food Safety Laws 2. Food adulteration. 3. Measures for Food Safety and Quality Management System 4. Shelf life and expiry of food products. 	7 hrs	7 marks	Power point presentation, Charts, Video & Project , Survey, Assignments.

References

1. Adams MR and Moss MO. (1995). Food Microbiology. 4th edition. New Age International (P) Limited Publishers, New Delhi, India.
2. Banwart JM. (1987). Basic Food Microbiology. 1st edition. CBS Publishers and Distributors, Delhi, India.
3. Davidson PM and Brannen AL. (1993). Antimicrobials in Foods. Marcel Dekker, New York.
4. Dillion VM and Board RG. (1996). Natural Antimicrobial Systems and Food Preservation. CAB International, Wallingford, Oxon.
5. Frazier WC and Westhoff DC. (1992). Food Microbiology. 3rd edition. Tata McGraw-Hill Publishing Company Ltd, New Delhi, India.
6. Gould GW. (1995). New Methods of Food Preservation. Blackie Academic and Professional, London.
7. Jay JM, Loessner MJ and Golden DA. (2005). Modern Food Microbiology. 7th edition, CBS Publishers and Distributors, Delhi, India.
8. Lund BM, Baird Parker AC, and Gould GW. (2000). The Microbiological Safety and Quality of Foods. Vol. 1-2, ASPEN Publication, Gaithersberg, MD.
9. Matthews KR, Kniel KE, and Montville TJ. (2017). Food Microbiology: An introduction. 4th edition, ASM Press.

Model Questions

1. Explain the factors affecting the spoilage of food
2. Explain the symptoms & consequence of food spoilage
3. How you detection of food spoilage
4. Why hygiene and sanitation in food service unit is important
5. What are causes and symptoms of food borne diseases
6. How you prevention food borne diseases
7. Explain the need of food preservation
8. Explain the methods for preservation
9. Explain food Safety Laws

	10. Describe the food adulteration 11. Explain the shelf life and expiry of food products
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The distribution of marks for continuous assessment test (CAT) shall be as follows:

Continues Assessment (Theory- Open Elective) for 20 marks		
MCQ Test 1 base on 25% syllabus	Consider best 2 out of 3 test	10 Marks
MCQ Test 2 base on 50% syllabus		
MCQ Test 3 base on 75% syllabus		
Assignments /GD/Seminar/ Poster presentation, quiz / Any innovative activities etc (any two activity 5 mark each)		10 Marks
Total		20 Marks

SantGadge Baba Amravati University, Amravati

NEP Syllabus

UG Programme

Faculty: Science and Technology

Subject: Microbiology

Course :B. Sc I Semester II : Open Elective

FACULTY: Science and technology

Teaching and Learning Scheme: (Three Years- Six Semesters Bachelor's Degree Programme)

Level	Semester	Course code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum marks
4.5	II	127207	Microbes for Sustainable Agriculture	2	30	2Hrs	30
		127208	Composting & Biogas technology	2	30	2Hrs	30

Microbiology

Open Elective Theory 3: 127207 Microbes for Sustainable Agriculture

Level	Semester	Course code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum marks
4.5	II	127207	Microbes for Sustainable Agriculture	2	30	2Hrs	30

COURSE Objectives:	<ul style="list-style-type: none"> To know the role of microorganisms in soil fertility and agriculture. To gain the knowledge about microorganisms that can be used as bio inoculants.
Course Outcomes	<p>Upon completion of this course successfully, students would be able to</p> <ul style="list-style-type: none"> Basic concepts of plant microbe interactions and plant beneficial microbes. Applications of microorganisms for sustainable agriculture.

Unit System	Contents	Workload allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit 1 Concepts of Soil Microbiology	<ul style="list-style-type: none"> • Soil physico-chemical properties • Soil organic matter and humus • Soil microbial communities • Concept of Rhizosphere • Rhizospheric microbes and their significance • Role of soil microbes in composting and humus formation 	8 hrs	8 marks	Power point presentation, Charts, Projects, Video, group discussion, Assignments, survey as per need
Unit 2 Plant-microbe interactions	<ul style="list-style-type: none"> • Positive interactions • Negative interactions • Plant growth promoting bacteria (PGPR) • Concept of rhizobium-legume symbiosis • Concept of Mycorrhizal symbiosis 	7 hrs	7 marks	Power point presentation, Charts, Projects, Video, group discussion, Assignments, survey as per need
Unit 3 Biofertilizers	<ul style="list-style-type: none"> • Basic concept of Biofertilizers • Nitrogen fixers: Symbiotic and non-symbiotic • Use of microorganisms as Biofertilizers • Types of Biofertilizers • Advantages of Biofertilizers 	8 hrs	8 marks	Power point presentation, Charts, Projects, Video, group discussion, Assignments, survey as per need
Unit 4 Biocontrol agents	<ul style="list-style-type: none"> • Adverse effects of chemical pesticides, fungicides and nematocides • Use of microorganisms as biocontrol agents • Biopesticides • Biofungicides • Bioinsecticides • Bionematocides • Entamopathogenic fungi 	7 hrs	7 marks	Power point presentation, Charts, Projects, Video, group discussion, Assignments, survey as per need

References :

- Agricultural Microbiology by G. Rangaswami and D. Bagyaraj
- Introduction to Soil Microbiology by Alexander M. Wiley Eastern Ltd.

- Biofertilizers in Agriculture and Forestry by Subbarao N.S, Oxford and IBH
- Principles of Microbiology, Atlas RM, Wm.C. Brown Pub, USA
- Plant pathology by Mehrotra R and Agarwal A, Tata Mcgraw- Hill pub.
- A textbook of Microbiology by R.C. Dubey and D. K. Maheshwari, Chand and company.

Model Questions	<p>Long questions:</p> <ol style="list-style-type: none"> 1. Explain the concept of Rhizospheric microbes and their significance 2. Explain the Concept of rhizobium- legume symbiosis 3. Explain the use of microorganisms as Biofertilizers. 4. Explain the use of microorganisms as Bio-control agent. <p>Short questions:</p> <ol style="list-style-type: none"> 1. What is Humus? 2. What is compost? 3. What is PGPR? 4. Define symbiosis. 5. Differentiate between symbiotic and non- symbiotic nitrogen fixing microorganisms 6. What are the advantages of biofertilizers? 7. Define biopesticides. 8. Define insecticides. <p>MCQ'S</p> <ol style="list-style-type: none"> 1. Which of the following is symbiotic nitrogen fixing microorganism? <ul style="list-style-type: none"> ▪ Azotobacter b. E. coli c. Rhizobium d. S.aureus 2. The full form of PGPR is----- <ol style="list-style-type: none"> a. Plant growth promoting rhizobacteria b. plant growth preventing rhizobacteria c. plant growth producing rhizoctonia d. plant growth promoting rhizoctonia 3. The area surrounding the plant root is called as----- <ol style="list-style-type: none"> a. Phyllosphere b. Rhizosphere c. Hemisphere d. Ecosphere 4. Bacillus thuringiensis is used as----- <ol style="list-style-type: none"> a. Biofertilizer b. Bionematocide c. Biopesticide d. Bioinsecticide
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The distribution of marks for the continues assessment test (CAT) shall be as follows:

Continues Assessment (Theory- Open Elective) for 20 marks		
MCQ Test 1 base on 25% syllabus	Consider best 2 out of 3 test	10 Marks
MCQ Test 2 base on 50% syllabus		
MCQ Test 3 base on 75% syllabus		
Assignments /GD/Seminar/ Poster presentation, quiz / Any innovative activities etc (any two activity 5 mark each)		10 Marks
Total		20 Marks

Microbiology

Open Elective Theory 4: 127208 Composting & Biogas technology

Level	Semester	Course code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum marks
4.5	II	127208	Composting & Biogas technology	2	30	2Hrs	30

COURSE Objectives:	<ul style="list-style-type: none"> To impart the knowledge of composting techniques. To learn the mechanism of converting agricultural waste into compost. To impart knowledge of biogas production Unit. 			
Course Outcomes	Upon completion of this course successfully, students would be able to <ul style="list-style-type: none"> Understand and apply the science of composting techniques. Illustrate biogas production unit and process. 			
Unit System	Contents	Workload allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
UNIT I Introduction of Composting	Definition of compost Classification of composting Science of composting Role of microbes in composting Importance of composting	8 hrs	8 marks	Chalk & Board, GD, Power point presentation, Charts, Video & Assignments.
Unit II Kinetics and Biochemistry of Composting	Carbon-nitrogen Balance; Ideal C: N Ration; Moisture content Temperature and oxygen availability	7 hrs	7 marks	Chalk & Board, Power point presentation, Charts, Projects, Video & Assignments.

Unit III Methods for Composting of Wastes	Indore Method Activated Compost Bangalore Method NADEP Method Windows Composting	8 hrs	8 marks	Chalk & Board, Power point presentation, Charts, Projects, Video & Assignments
Unit IV Biogas Technology	Introduction to Biogas Role of Microbes in Biogas Scope of Biogas in India Design and Construction of Biogas Advance technology for Biogas energy production	7 hrs	7 marks	Power point presentation, Charts, Video & Project , Survey, Assignments.

References

2. Composting Technology by [D K Gupta Laxmi Lal](#)
3. The Rodale Book of Composting, Newly Revised and Updated: Simple Methods to Improve Your Soil, Recycle Waste, Grow Healthier Plants, and Create an Earth-Friendly Garden (Rodale Classics)
4. The Complete Technology Book on Biofertilizer and Organic Farming Paperback – 31 December 2022 by Dr. Himadri Panda (Author)
5. The Organic Waste Composting Handbook by Jackson Lawrence

Model Questions

1. Explain Composting and its classification.
2. What is the role of Microbes in Composting? List few commonly used Microbes.
3. How do microorganisms contribute to the breakdown of organic materials
4. Why is composting considered necessary in sustainable waste management and agriculture practices?
5. What does the C:N ratio describe, and why is the optimal C:N ratio essential?
6. What factors, such as moisture content, temperature, and oxygen availability, influence the success of the composting process?
7. Differentiate between the Indore, Activated, Bangalore, and NADEP composting methods. What are their respective advantages and limitations?
8. What is the significance of windows composting, and how does it differ from traditional composting methods?
9. Introduce the concept of biogas, elucidating the role of microbes in biogas production.
10. Describe how biogas can benefit India and discuss technological advancements for efficient biogas energy production.

The distribution of marks for the continues assessment test (CAT) shall be as follows:

Continues Assessment (Theory- Open Elective) for 20 marks		
MCQ Test 1 base on 25% syllabus	Consider best 2 out of 3 test	10 Marks
MCQ Test 2 base on 50% syllabus		
MCQ Test 3 base on 75% syllabus		
Assignments /GD/Seminar/ Poster presentation, quiz / Any innovative activities etc (any two activity 5 mark each)		10 Marks
Total		20 Marks